CLAIMS

1. A method for detecting and quantifying an oxidizable contaminant in a gas stream at a low concentration level which comprises:

a. subjecting at least a portion of said gas stream to an oxidation reaction under conditions sufficient to effect complete oxidation of said contaminant to an oxidized product whose presence is more readily detected and quantified than is said contaminant at said low concentration level;

b. determining the quantity of said oxidized product in said portion after said complete oxidation; and

c. determining from said quantity of oxidized product the concentration of said oxidizable contaminant in said portion from the stoichiometry of the oxidation reaction.

2. A method as in Claim 1 wherein said oxidizable contaminant is selected from the group consisting of hydrocarbons, siloxanes, organosilanes, organosulfides, organophosphides and organohalides.

3. A method as in Claim 2 wherein concentration of said oxidizable contaminant is reduced to less than 1000 ppt.

4. A method as in Claim 3 wherein concentration of said oxidizable contaminant is reduced to less than 500 ppt.

5. A method as in Claim 4 wherein concentration of said oxidizable contaminant is reduced to less than 100 ppt.

6. A method as in Claim 5 wherein concentration of said oxidizable contaminant is reduced to less than 10 ppt.

7. A method as in Claim 1 wherein said subjecting comprises contacting said portion to contact with an oxidation catalyst under conditions sufficient to effect complete catalytic oxidation of said contaminant to an oxidized product.

8. A method as in Claim 7 wherein said oxidation catalyst comprises a transition metal or lanthanide metal or combinations thereof.

9. A method as in Claim 7 wherein said oxidation catalyst is supported on an oxygen-rich inorganic substrate or present as an alloy or solid solution.

10. A method as in Claim 9 wherein said substrate comprises zirconia, ceria, or alumina.

11. A method as in Claim 1 wherein said oxidation product has a higher concentration in said portion after oxidation than did said contaminant prior to oxidation.

12. A method as in Claim 1 wherein said oxidation product is effectively detectable and quantifiable at lower concentrations in said portion than is said contaminant.

13. A method as in Claim 1 wherein sufficient oxygen for said complete oxidation comprises oxygen or air which is present in said portion of said gas stream.

14. A method as in Claim 1 wherein said portion of said gas stream contains insufficient oxygen for said complete oxidation and said method further comprises adding free oxygen or air to said portion prior to said complete oxidation.

15. A method as in Claim 1 wherein said contaminant comprises a hydrocarbon at a concentration of less than 3000 ppt and said oxidation product comprises at least one of water or carbon dioxide.

16. A method as in Claim 1 further comprising a plurality of oxidizable contaminants in said gas stream.

17. A method as in Claim 16 further comprising selectively quantifying concentrations of contaminants within said plurality by controlling conditions of said oxidation such that less than all of said plurality of said contaminants are completely oxidized.

18. A method as in Claim 17 wherein said oxidation is by contact of said portion with an oxidation catalyst and controlling conditions comprises maintaining temperature at which said contact occurs within a temperature range at which less than all of said plurality of contaminants are catalytically oxidized.

19. A method as in Claim 1 wherein said contaminant comprises a hydrocarbon of unknown identity and said method further comprises determining the saturation ratio of said hydrocarbon from analysis of the oxidized product, such that identity of said hydrocarbon may thereafter be determined.

20. A method as in Claim 1 wherein said steps a., b. and c. are accomplished by means embodied in a compact transportable system.